

BEST AVAILABLE COPY

REC'D 29 JAN 2004

WFO

PCT

P1 1117504

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office

January 22, 2004

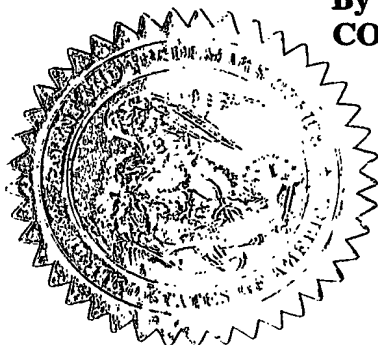
THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 10/387,242

FILING DATE: March 12, 2003

RELATED PCT APPLICATION NUMBER: PCT/US03/35337

By Authority of the  
COMMISSIONER OF PATENTS AND TRADEMARKS



*H. L. Jackson*  
H. L. JACKSON  
Certifying Officer

PRIORITY DOCUMENT  
SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH  
RULE 17.1(a) OR (b)

03/13/03 10/38/242 .031203

03/12/03

U.S. PTO

**UTILITY PATENT APPLICATION TRANSMITTAL  
(Large Entity)**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.  
CONS-0107

Total Pages in this Submission

**TO THE ASSISTANT COMMISSIONER FOR PATENTS**Box Patent Application  
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

**CONTAINER EXHIBITING IMPROVED TOP LOAD PERFORMANCE**10/38/242  
03/12/03  
U.S. PTO

and invented by:

Kamineni, et al.

If a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: \_\_\_\_\_

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: \_\_\_\_\_

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: \_\_\_\_\_

Enclosed are:

**Application Elements**

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 8 pages and including the following:
  - a. ☒ Descriptive Title of the Invention
  - b. ☐ Cross References to Related Applications (if applicable)
  - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
  - d. ☐ Reference to Sequence Listing, a Table, or a Computer Program Listing Appendix
  - e. ☒ Background of the Invention
  - f. ☒ Brief Summary of the Invention
  - g. ☒ Brief Description of the Drawings (if filed)
  - h. ☒ Detailed Description
  - i. ☒ Claim(s) as Classified Below
  - j. ☒ Abstract of the Disclosure

# UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.  
CONS-0107

Total Pages in this Submission

## Application Elements (Continued)

3. ☒ Drawing(s) (when necessary as prescribed by 35 USC 113)
  - a. ☒ Formal                      Number of Sheets 2 sheets bearing Figs. 1-4
  - b. ☐ Informal                      Number of Sheets \_\_\_\_\_
4. ☒ Oath or Declaration
  - a. ☐ Newly executed (original or copy)                      ☒ Unexecuted
  - b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)
  - c. ☒ With Power of Attorney                      ☐ Without Power of Attorney
  - d. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting inventor(s) named in the prior application,  
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (usable if Box 4b is checked)  
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ CD ROM or CD-R in duplicate, large table or Computer Program (Appendix)
7. ☐ Application Data Sheet (See 37 CFR 1.76)
8. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all must be included)
  - a. ☐ Computer Readable Form (CRF)
  - b. ☐ Specification Sequence Listing on:
    - i. ☐ CD-ROM or CD-R (2 copies); or
    - ii. ☐ Paper
  - c. ☐ Statement(s) Verifying Identical Paper and Computer Readable Copy

## Accompanying Application Parts

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(B) Statement (when there is an assignee)
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure Statement/PTO-1449                      ☒ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☒ Certificate of Mailing
 

☐ First Class    ☒ Express Mail (Specify Label No.): EL606862124US

**UTILITY PATENT APPLICATION TRANSMITTAL**  
**(Large Entity)***(Only for new nonprovisional applications under 37 CFR 1.53(b))*Docket No.  
CONS-0107

Total Pages in this Submission

**Accompanying Application Parts (Continued)**

17. ☐ Additional Enclosures *(please identify below):*

**Request That Application Not Be Published Pursuant To 35 U.S.C. 122(b)(2)**

18. ☐ Pursuant to 35 U.S.C. 122(b)(2), Applicant hereby requests that this patent application not be published pursuant to 35 U.S.C. 122(b)(1). Applicant hereby certifies that the invention disclosed in this application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication of applications 18 months after filing of the application.

**Warning**

***An applicant who makes a request not to publish, but who subsequently files in a foreign country or under a multilateral international agreement specified in 35 U.S.C. 122(b)(2)(B)(i), must notify the Director of such filing not later than 45 days after the date of the filing of such foreign or international application. A failure of the applicant to provide such notice within the prescribed period shall result in the application being regarded as abandoned, unless it is shown to the satisfaction of the Director that the delay in submitting the notice was unintentional.***

# UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.  
CONS-0107

Total Pages in this Submission

## Fee Calculation and Transmittal

### CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	14	- 20 =	0	x \$18.00	\$0.00
Indep. Claims	1	- 3 =	0	x \$84.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$750.00
OTHER FEE (specify purpose) _____					\$0.00
TOTAL FILING FEE					\$750.00

- ☒ A check in the amount of \$750.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 50-0462 as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of \_\_\_\_\_ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: March 12, 2003

cc:

Signature  
John L. Knoble - Registration No. 32,387  
KNOBLE & YOSHIDA, LLC  
Eight Penn Center, Suite 1350  
1628 John F. Kennedy Blvd.  
Philadelphia, PA 19103  
Tel: (215) 599-0600  
Customer No. 21,302

**CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)**Applicant(s): **Kamineni et al.**

Docket No.

**CONS-0107**

Serial No.

**Unknown**

Filing Date

**Herewith**

Examiner

**Unknown**

Group Art Unit

**Unknown**Invention: **CONTAINER EXHIBITING IMPROVED TOP LOAD PERFORMANCE**

I hereby certify that the following correspondence:

**Utility Patent Application Transmittal; Specification having 8 pages including claims and abstract of disclosure; Two Sheets of Formal Drawings bearing Figs. 1-4; Unexecuted Declaration and Power of Attorney; PTO-1449 and copies of five (5) cited references; Acknowledgement Postcard and a \$750.00 check for filing fees.**

*(Identify type of correspondence)*

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: The Assistant Commissioner for Patents, Washington, D.C. 20231 on

**March 12**, 2003*(Date)***Carla P. McDuffie***(Typed or Printed Name of Person Mailing Correspondence)**(Signature of Person Mailing Correspondence)***EL606862124US***("Express Mail" Mailing Label Number)***Note: Each paper must have its own certificate of mailing.**

CCK-0107

PATENT

## CONTAINER EXHIBITING IMPROVED TOP LOAD PERFORMANCE

5

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention relates generally to the field of consumer packaging. More specifically, this invention relates to plastic containers of the type that are used to package consumer beverages, and the strength characteristics of such plastic containers.

**10 2. Description of the Related Technology**

Plastic containers are in wide use commercially throughout the world for packaging liquids of all types, including consumer beverages. The most common type of plastic container that is used for packaging, for example, soft drinks, is fabricated from polyethylene terephthalate (PET) and is molded into a desired shape using a blowmolding process that is well known in the  
15 industry.

In the design of such containers, a number of factors are ordinarily considered. The container must be chemically resistant and should be shaped to avoid concentration of stress that result in unwanted failure. In addition, the container must be strong enough to endure the packaging process and subsequent handling during the gross packaging, shipping and retail  
20 display stages.

One type of strength that plastic containers are regularly evaluated for it is that of top load strength. Top load strength involves resistance to failure, typically sidewall buckling, when a vertical force is exerted onto the top of the container. Such vertical force is exerted onto the container during the filling process and when the closure is installed onto the container. In  
25 addition, a great deal of vertical force may be exerted onto filled containers when cases of the containers are stacked during shipping. Another type of strength that is regularly evaluated in the design of plastic containers is hoop strength. Hoop strength is the resistance provided by the

CCK-0107

PATENT

container against the tendency of the container sidewall to bow outwardly or deflect inwardly when the contents of the container are under pressurization or when external forces are applied to the outside of the container, which of course is a common scenario in the packaging and transportation of carbonated soft drinks.

5 It is generally known in the industry that circumferential reinforcement such as ribbing tends to increase hoop strength, and that vertical reinforcement has a favorable effect on top load strength. However, it should be understood that there is a to economic disincentive to provide any more reinforcement to a plastic container design than is absolutely necessary, because increased reinforcement tends to make the container heavier and thus more expensive to  
10 manufacture. A need exists, then, for a plastic container design that optimizes hoop strength and top load strength while minimizing the amount of plastic material that is necessary to fabricate the container.

15

#### SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a plastic container design that optimizes hoop strength and top load strength while minimizing the amount of plastic material that is necessary to fabricate the container.

20 In order to achieve the above and other objects of the invention, a plastic container that is constructed according to a first aspect of the invention includes a finish portion; and a generally cylindrical main body portion, said main body portion comprising a sidewall having a first plurality of generally vertical ribs defined therein, the sidewall further having a second plurality of generally horizontal wave shaped ribs defined therein, at least one of the generally horizontal wave shaped ribs intersecting with at least one of the generally vertical ribs, whereby enhanced  
25 strength characteristics are imparted to the container.

These and various other advantages and features of novelty that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by



CCK-0107

PATENT

its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

5

### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIGURE 1 is a side elevational view of a plastic container that is constructed according to a preferred embodiment of the invention;

FIGURE 2 is a cross-sectional view taken along lines 2-2 in FIGURE 1;

FIGURE 3 is a cross-sectional view taken along blinds 3-3 in FIGURE 1; and

10

FIGURE 4 is a diagrammatical depiction of one of the wave-shaped ribs with the circumference of the container represented along the x-axis.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

15

Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring in particular to FIGURE 1, a plastic container 10 that is constructed according to a preferred embodiment of the invention includes a finish portion 12 and a generally cylindrical main body portion 14 having an outer sidewall 16. Preferably, plastic container 10 is fabricated from a plastic material such as polyethylene terephthalate. As may be seen in FIGURE 1, body portion 14 has a first plurality of generally vertical ribs 18, 20, 22, 24 defined therein. Vertical ribs 18, 20, 22, 24, as shown in the cross-sectional view provided in FIGURE 3, are substantially concave, having a radius of depth  $R_2$ , and extend generally radially inwardly toward the center axis of the container 10. The vertical ribs are preferably parallel to each other and evenly spaced from each other over the outer circumference of the main body portion 14 of the container 10.

20

25

As may further be seen in FIGURE 1, the sidewall 16 further has a second plurality of generally horizontal wave shaped ribs 26, 28, 30, 32, 34, 36 defined therein. The generally horizontal wave shaped ribs 26, 28, 30, 32, 34, 36 preferably extend so as to be parallel with each other and are substantially evenly spaced from each other. It follows, then, that each of the wave

CCK-0107

PATENT

shaped ribs has a common amplitude A and wavelength with each of the other wave shaped ribs, with the amplitude A being defined as the peak to peak vertical distance between the uppermost point of the wave crest to the lowermost point of the adjacent wave trough and the wavelength being defined as the circumferential peak to peak distance traveled by the rib from wave crest to wave crest. Each horizontal wave shaped rib is substantially concave, having a radius of depth R<sub>1</sub>, and extending inwardly toward the center axis of the container 10. As may be seen in FIGURE 1, at least one of the generally horizontal wave shaped ribs intersects with at least one of said generally vertical ribs, whereby enhanced strength characteristics are imparted to the container.

In the preferred embodiment, it will be seen that each of the generally horizontal wave shaped ribs 26, 28, 30, 32, 34, 36 intersects with each of the 16 vertical ribs. Preferably, a plurality, and more preferably at least three of the vertical ribs intersect each wave shaped rib within each wavelength. According to one important aspect of the invention, the location or placement of the vertical ribs is harmonized with respect to the waveform of at least one of the horizontal ribs. In the preferred embodiment, the vertical ribs 18, 20, 22, 24 will intersect each of the generally horizontal wave shaped ribs 26, 28, 30, 32, 34, 36 in a repeating pattern such that each of the vertical ribs 18 intersects each wave shaped rib at the lowermost point of the wave trough, and so that each of the vertical ribs 20 intersects each wave shaped rib at a median location between the wave trough and an adjacent wave peak. Also, each vertical rib 22 will intersect each wave shaped rib at the wave peak and each vertical rib 24 will intersect each wave shaped rib at a median location between the wave peak and the next wave trough. Accordingly, at least one of the generally vertical ribs 18, 20, 22, 24 intersects at least one of the generally horizontal wave shaped ribs 26, 28, 30, 32, 34, 36 at a location of maximum amplitude of the wave shaped rib, and another one of the generally vertical ribs intersects the horizontal wave shaped rib at a location of minimum amplitude. This is believed to maximize both the hoop strength and top load strength that is achievable by the structure.

As may be visualized in FIGURE 1, sidewall 16 of the generally cylindrical main body portion 14 has an outer circumference. As is shown in FIGURE 4, which is a diagrammatical

CCK-0107

PATENT

depiction of one of the wave-shaped ribs with the circumference of the container represented along the x-axis, each wave-shaped rib preferably has a repeating wavelength  $\lambda$  and a common amplitude A. An angle  $\theta$  is defined by a triangle, two legs of which are equal to the amplitude A and one-half the wavelength  $\lambda$ . Preferably, the amplitude A of the wave shaped ribs is within a  
5 range of about 4.5 percent to about 30 percent of the wavelength  $\lambda$ , which corresponds to angle  $\theta$  being within a range of about 5 degrees to about 30 degrees. The wavelength  $\lambda$  should preferably be about 6 percent to about 40 percent of the outer circumference of the container.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together  
10 with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

CCK-0107

PATENT

**WHAT IS CLAIMED IS:**

1. A plastic container, comprising:
  - a finish portion; and
  - a generally cylindrical main body portion, said main body portion comprising a sidewall having a first plurality of generally vertical ribs defined therein, said sidewall further having a second plurality of generally horizontal wave shaped ribs defined therein, at least one of said generally horizontal wave shaped ribs intersecting with at least one of said generally vertical ribs, whereby enhanced strength characteristics are imparted to the container.
2. A plastic container according to claim 1, wherein said container is fabricated from a plastic material comprising polyethylene terephthalate.
3. A plastic container according to claim 1, wherein said first plurality of generally vertical ribs comprise at least one rib that is inwardly oriented.
4. A plastic container according to claim 1, wherein said second plurality of generally horizontal wave shaped ribs comprise at least one rib that is inwardly oriented.
5. A plastic container according to claim 1, wherein said second plurality of generally horizontal wave shaped ribs comprise a plurality of wave shaped ribs that extend generally parallel to each other.
6. A plastic container according to claim 1, wherein said second plurality of generally horizontal wave shaped ribs are shaped so as to have a common amplitude and a common wavelength.
7. A plastic container according to claim 6, wherein said common amplitude A is within a range of about 4.5 percent to about 30 percent of the common wavelength.

CCK-0107

PATENT

8. A plastic container according to claim 6, wherein said sidewall has an outer circumference, wherein said wavelength is within a range of about 6 percent to about 40 percent of said outer circumference.
9. A plastic container according to claim 1, wherein at least one of said generally vertical ribs intersects at least one of said generally horizontal wave shaped ribs at a location of maximum amplitude of said wave shaped rib.
10. A plastic container according to claim 1, wherein at least one of said generally vertical ribs intersects at least one of said generally horizontal wave shaped ribs at a location of minimum amplitude of said wave shaped rib.
11. A plastic container according to claim 1, wherein at least one of said generally horizontal wave shaped ribs has a periodic wavelength, and wherein a plurality of said vertical ribs intersect said wave shaped rib within each wavelength.
12. A plastic container according to claim 11, wherein at least three of said vertical ribs intersect said wave shaped rib within each wavelength.
13. A plastic container according to claim 11, wherein the location of said vertical ribs is harmonized with respect the waveform of at least one of said horizontal ribs.
14. A plastic container according to claim 1, wherein the location of said vertical ribs is harmonized with respect the waveform of at least one of said horizontal ribs.

CCK-0107

PATENT

**ABSTRACT OF THE DISCLOSURE**

A plastic container that exhibits an optimal ratio of hoop strength to top load strength includes a finish portion and generally cylindrical main body portion. The main body portion includes a sidewall that has a first plurality of generally vertical ribs defined therein. In addition, a second plurality of generally horizontal wave shaped ribs is defined in the sidewall. The generally horizontal wave shaped ribs intersect with the generally vertical ribs, thereby imparting enhanced strength characteristics to the container.

Docket No.  
CONS-0107

## Declaration and Power of Attorney For Patent Application

### English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**CONTAINER EXHIBITING IMPROVED TOP LOAD PERFORMANCE**

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on \_\_\_\_\_ as United States Application No. or PCT International  
Application Number \_\_\_\_\_  
and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)

☐

\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)

☐

\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)

☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

_____	_____
(Application Serial No.)	(Filing Date)
_____	_____
(Application Serial No.)	(Filing Date)
_____	_____
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)
_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)
_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

**John L. Knoble - Registration No. 32,387**  
**Ken I. Yoshida - Registration No. 37,009**  
**Kevin J. Dunleavy - Registration No. 32,024**  
**Maria M. Kourtakis - Registration No. 41,126**  
**Donna R. Maddox - Registration No. 34,913**

**Send Correspondence to:** **KNOBLE & YOSHIDA, LLC**  
**Eight Penn Center, Suite 1350**  
**1628 John F. Kennedy Blvd.**  
**Philadelphia, PA 19103**

**Direct Telephone Calls to:** *(name and telephone number)*  
**John L. Knoble - 215-599-0600**

Full name of sole or first inventor <b>Satya Kamineni</b>	
Sole or first inventor's signature	Date
Residence <b>816 South Adams Street, #C504, Westmont, IL 60559</b>	
Citizenship <b>India</b>	
Post Office Address <b>Same as above.</b>	

Full name of second inventor, if any <b>Michael Mooney</b>	
Second inventor's signature	Date
Residence <b>21356 Bramble Drive, Frankfort, IL 60423</b>	
Citizenship <b>US</b>	
Post Office Address <b>Same as above.</b>	

1/2

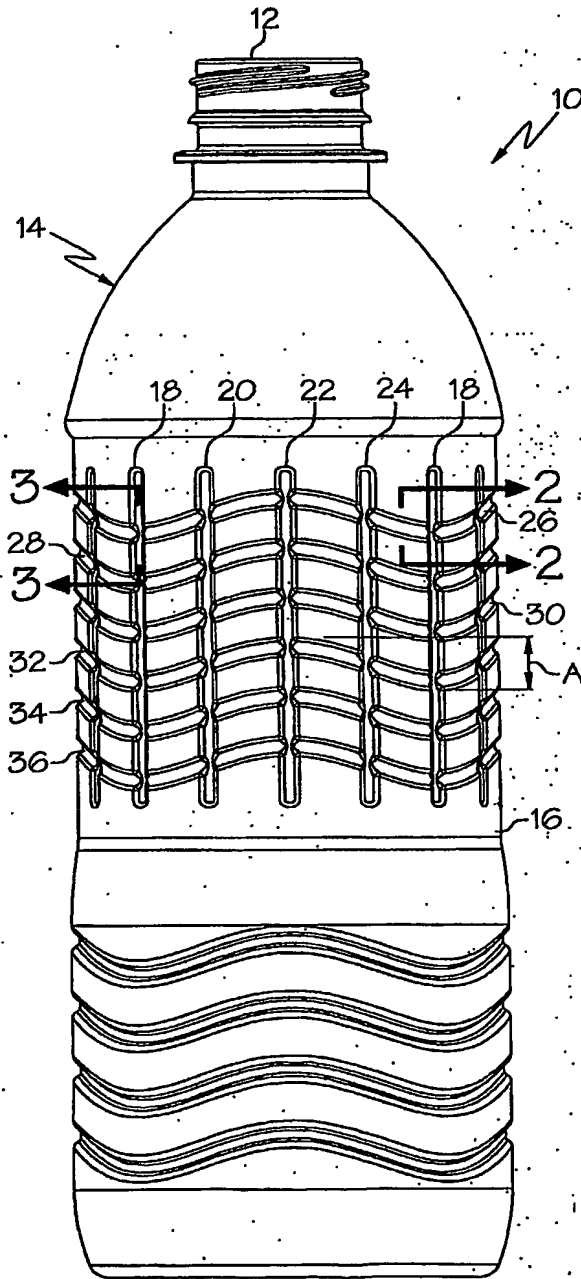


FIG. 1

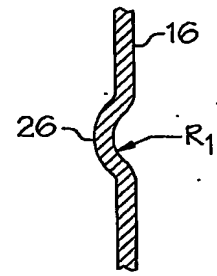


FIG. 2

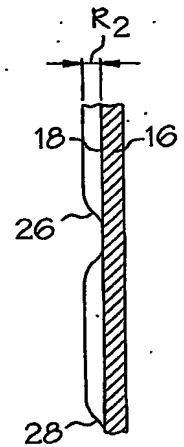


FIG. 3

2/2

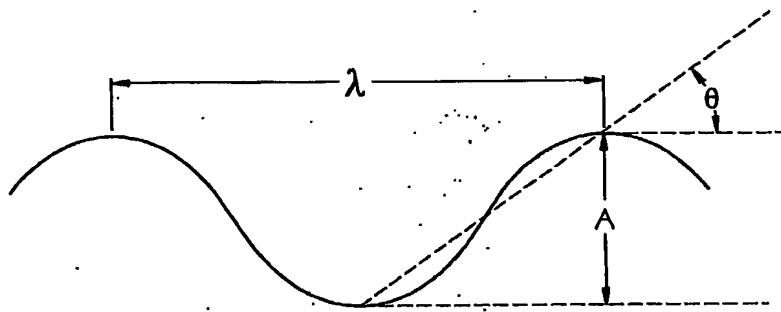


FIG. 4

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**